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Xcel Energy

Docket No.: E002/CN-05-123

Response To: MN Dept of Commerce Information Request No. 10

Date Received: August 1, 2005

Question:

Subject: CON Supplement – Radiation monitoring, dispersion patterns, and comparison to federal standards.

1. The first paragraph on page S.45 says that TLD radiation readings at sample sites are similar to controls, with one or two exceptions. Please indicate which sites are the exceptions and their location. Please indicate whether the monitoring data for those sites are provided in supplement Appendix S4, and if so where. If the data are not in Appendix S4, please provide the data and comparison data from background sites.
2. The next sentence in the same paragraph states that a conservative calculation at the plant boundary demonstrates that exposure is below the federal 25 millirem limit. Please provide the details of that calculation or point out where the calculation is in Appendix S4.
3. Regarding Figures S8 to S11, please provide the underlying data for the figures, including an example calculation of how the exposure index is calculated and which figure corresponds to which exposure pathway. The text also says that your radionuclide dispersion and exposure analyses demonstrate that the calculated radiation exposure is far below applicable standards. Please clarify whether the data supporting this conclusion is provided in Appendix S4 in the Radioactive Effluent Release Report (Table 1 and Table 2). And if not, please provide the supporting data. Please also indicate whether the dispersion models, deposition rates, and other calculation methods referred to in the text and used to create the data shown in Figures S8 to S11 are those referenced in Appendix S4 as the Monticello Offsite Dose Calculation Manual (Enclosure 4). Please provide the CD-ROM of the Monticello Offsite Dose Calculation Manual 2004.
4. Please indicate specifically how the particulate monitoring at the five air sampler locations is used as a check on the calculations of airborne radioisotope dispersion. Please also clarify whether the dispersion modeling exposure results shown in Figures S8 to S11 were used to select the critical receptor for off-site

exposure estimates in Table 1 of the 2004 Radioactive Effluent Release Report. If not, please explain how the critical receptor was determined.

Response:

1. The sample sites for TLD locations are contained in Appendix S4. The last enclosure in this appendix is the NMC 2004 Annual Radiological Environmental Operating Report dated April 29, 2005. In this report, a map of TLD locations is shown on page D-2, entitled "Figure D-1, Sample Collection and Analysis program: TLD locations, Inner ring". There are 14 locations in all, numbered M01A thru M14A. These locations are also listed in Table 5.2 along with further information about the sample location. The TLD data is collected from these locations each calendar quarter and sent to an outside firm to be read. The data is published in an annual report entitled Radiological Environmental Monitoring Program (REMP). Table 1 from the REMP report, "Ambient gamma radiation as measured by TLD's" is attached.

Table 1 lists the quarterly results for the most recent reporting year. The four control locations have an annual average ranging from 14.6 to 16.5 [mRem/91days].

The fourteen TLD locations at the site's boundary have an annual average ranging from 15.1 to 18.4 [mRem/91days]. The two locations with annual averages slightly greater than the control averages are M-12A and M-14A.

2. The results for site boundary dose are reported annually in the Radioactive Effluent Release Report.

The methodology for assessing compliance with federal radiation standards at the site boundary is to subtract the average of the quarterly control TLD's from the average of the quarterly site boundary TLD's. These four quarterly boundary dose values are then summed to determine the annual site boundary dose.

3. There are two gaseous release points that are independently monitored at the Monticello plant. One is the Off-gas Stack and the other is the Reactor Building Vent. The X/Q (sec/m³) term is for the dispersion pathway of airborne radionuclides and the D/Q (m⁻²) for all other pathways (deposition) of radionuclides. The calculation method is further described in Chapter 5 of the Offsite Dose Calculation Manual (ODCM).

The data provided in Table 1 of the Radioactive Effluent Release Report provides a summary of the computed offsite doses from plant sources.

The data used to generate Figures S8 to S11 is contained in Appendix A of the ODCM. The ODCM is attached in CD-ROM form.

4. The five air sampler locations are used to measure particulates in the environment surrounding the plant. There is no program in place that uses these particulate sampler results as a direct check of the offsite calculations. There are real time monitors that provide noble gas activity in the Off-gas Stack. This provides immediate indication of the gaseous release activity independent of the weekly collection and reading of the filters.

The selection of the critical receptor is as follows:

- NMC identifies the nearest garden, residence and milk animal in each of the 16 sectors.
- NMC looks up the D/Q (deposition) and x/Q (dispersion) factors for each location from the ODCM tables.
- The locations with the highest D/Q are entered as input into the computer program GASPARE.
- GASPARE calculates dose at these locations based on D/Q, x/Q and the isotopic releases from the previous year.
- The doses are calculated for each age group, (adult, teen, child and infant) and for each pathway (ingestion, inhalation, plume and ground)
- The doses at each location are summed and the location with the highest total dose is determined to be the critical receptor.

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Table 1. Ambient gamma radiation as measured by thermoluminescent dosimeters (TLD's).

Location	mRem/91 days				Cumulative Average	Previous Annual Average
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.		
<u>Indicators (Inner Ring, General Area of Site Boundary)</u>						
M-01A	14.4 ± 0.8	15.4 ± 1.0	15.9 ± 0.7	15.7 ± 0.7	15.4	15.5
M-02A	15.0 ± 0.8	15.9 ± 0.6	17.5 ± 1.0	16.0 ± 0.6	16.1	15.9
M-03A	15.2 ± 1.4	15.5 ± 1.2	17.5 ± 1.5	16.1 ± 1.0	16.1	15.5
M-04A	14.1 ± 0.9	15.5 ± 0.7	16.6 ± 1.3	15.7 ± 0.4	15.5	15.1
M-05A	14.1 ± 0.7	15.7 ± 0.8	16.3 ± 0.9	16.3 ± 0.6	15.6	15.0
M-06A	14.8 ± 0.5	16.0 ± 0.5	17.0 ± 0.7	15.9 ± 0.5	15.9	15.5
M-07A	14.9 ± 0.8	15.4 ± 0.6	17.6 ± 0.9	15.9 ± 0.7	16.0	15.5
M-08A	14.6 ± 1.6	15.1 ± 0.7	16.4 ± 1.1	15.9 ± 0.4	15.5	14.9
M-09A	14.8 ± 1.0	14.2 ± 0.9	17.1 ± 1.1	14.4 ± 0.5	15.1	15.1
M-10A	14.9 ± 1.3	15.9 ± 0.7	17.7 ± 1.4	16.1 ± 0.6	16.2	15.7
M-11A	15.7 ± 0.7	15.6 ± 0.5	18.6 ± 0.7	15.8 ± 0.4	16.4	16.0
M-12A	17.2 ± 0.7	17.8 ± 0.6	20.4 ± 0.8	18.0 ± 0.5	18.4	17.6
M-13A	14.8 ± 1.0	14.4 ± 0.8	17.0 ± 1.1	14.7 ± 0.8	15.2	15.2
M-14A	15.2 ± 0.6	16.6 ± 0.4	18.8 ± 0.9	16.8 ± 0.3	16.9	16.5
Mean ± s.d.	15.0 ± 0.8	15.6 ± 0.9	17.5 ± 1.2	16.0 ± 0.8	16.0	15.6
<u>Indicators (Outer Ring, 4-5 Miles Distant)</u>						
M-01B	15.0 ± 1.0	15.2 ± 0.6	17.3 ± 0.9	15.5 ± 0.5	15.8	15.4
M-02B	16.5 ± 1.7	15.4 ± 0.6	17.9 ± 1.0	15.5 ± 0.5	16.3	15.8
M-03B	12.9 ± 0.8	12.9 ± 0.8	15.2 ± 0.9	13.0 ± 0.6	13.5	12.9
M-04B	13.4 ± 0.8	14.9 ± 0.5	15.5 ± 0.7	14.4 ± 0.6	14.6	14.0
M-05B	15.4 ± 0.7	15.7 ± 0.8	17.2 ± 0.8	15.9 ± 0.7	16.1	15.9
M-06B	12.7 ± 0.7	15.8 ± 0.5	ND ^a	15.8 ± 0.6	14.8	14.8
M-07B	15.8 ± 0.9	15.6 ± 0.9	17.9 ± 1.1	15.7 ± 0.8	16.3	15.7
M-08B	14.3 ± 0.7	15.4 ± 0.7	15.5 ± 0.9	15.6 ± 0.6	15.2	14.9
M-09B	15.3 ± 0.9	16.8 ± 0.9	17.7 ± 1.1	17.0 ± 0.7	16.7	16.2
M-10B	15.0 ± 0.6	15.9 ± 0.9	17.9 ± 0.8	15.5 ± 0.6	16.1	15.9
M-11B	15.2 ± 1.2	16.4 ± 0.8	17.0 ± 0.9	15.7 ± 0.6	16.1	15.7
M-12B	14.3 ± 0.9	15.8 ± 0.6	16.7 ± 0.8	15.6 ± 0.6	15.6	15.8
M-13B	14.2 ± 0.6	14.1 ± 0.6	15.4 ± 0.8	14.2 ± 0.6	14.5	14.0
M-14B	14.5 ± 0.8	15.8 ± 0.6	16.6 ± 1.4	15.9 ± 0.5	15.7	15.3
M-15B	14.4 ± 0.6	15.3 ± 0.9	16.2 ± 0.8	15.2 ± 0.7	15.3	14.9
M-16B	13.6 ± 0.7	13.5 ± 0.5	14.8 ± 0.7	13.8 ± 0.4	13.9	13.7
Mean ± s.d.	14.5 ± 1.0	15.3 ± 1.0	16.6 ± 1.1	15.3 ± 1.0	15.4	15.0

^a "ND" = No data; see Table 2.0, Listings of Missed Samples.

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Table 1. Ambient gamma radiation as measured by thermoluminescent dosimeters (TLD's),
(continued).

Location	mRem/91 days				Cumulative Average	Previous Annual Average
	1st Qtr.	2nd Qtr.	3rd Qtr.	4th Qtr.		
<u>Control</u>						
M-01C	14.6 ± 0.8	14.4 ± 0.8	16.7 ± 0.9	14.3 ± 0.7	15.0	14.7
M-02C	14.8 ± 1.3	15.8 ± 1.0	16.8 ± 1.2	15.4 ± 0.7	15.7	15.3
M-03C	15.6 ± 1.1	16.1 ± 1.0	18.4 ± 1.1	15.8 ± 0.8	16.5	15.9
M-04C	14.4 ± 0.6	13.9 ± 0.4	15.9 ± 0.7	14.0 ± 0.6	14.6	14.2
Mean ± s.d.	14.9 ± 0.5	15.1 ± 1.1	17.0 ± 1.0	14.9 ± 0.9	15.4	15.0
<u>Indicators (Special Interest Areas)</u>						
M-01S	12.7 ± 1.0	13.4 ± 0.5	13.7 ± 1.1	13.8 ± 0.5	13.4	13.2
M-02S	11.0 ± 0.6	12.7 ± 0.8	12.9 ± 1.3	13.1 ± 1.0	12.4	11.8
M-03S	14.4 ± 1.0	16.2 ± 1.1	16.5 ± 1.2	15.8 ± 1.1	15.7	15.3
M-04S	15.3 ± 0.9	16.4 ± 0.6	16.9 ± 1.1	16.3 ± 1.2	16.2	15.4
M-05S	15.2 ± 1.5	15.7 ± 0.8	16.3 ± 0.8	15.7 ± 0.8	15.7	15.2
M-06S	16.6 ± 0.7	17.9 ± 1.5	17.5 ± 0.8	17.0 ± 0.7	17.3	16.8
Mean ± s.d.	14.2 ± 2.0	15.4 ± 2.0	15.6 ± 1.9	15.3 ± 1.5	15.1	14.6